

## The Friary School

### Numeracy Across The Curriculum Policy

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The fundamental purpose of The Friary School is to provide high quality education for all pupils within a caring environment dedicated to learning in which independence, tolerance and partnership are encouraged.

This policy is designed to support School Aims 1 and 2 and Objectives 1, 2, 3 and 18. It should be read in conjunction with the Annual Key Stage 3 Development Plan.

The policy is designed to support development at KS3, although its general principles can be extended to most, if not all subjects at KS4 and KS5.

#### 1. General Aims

The Friary School is committed to raising the standards of numeracy of all its students, so that they develop the ability to use numeracy skills effectively in all areas of the curriculum and to cope confidently with the demands of further education, employment and adult life.

#### 2. Rationale

- Being numerate is essential for pupils to prepare them for adult life.
- Numeracy is a proficiency that is developed mainly in mathematics but also in other subjects. It is more than an ability to do basic arithmetic.
- Numeracy involves developing confidence and competence with numbers and measures. It requires understanding of the number system, a repertoire of mathematical techniques, and an inclination and ability to solve quantitative or spatial problems in a wide range of contexts. Numeracy also demands understanding of the ways in which data are gathered by counting and measuring, and presented in graphs, diagrams, charts and tables.
- Poor numeracy skills hold back pupils' progress and can lower their self-esteem. Numeracy skills can be consolidated and enhanced when pupils have opportunities to apply them across the curriculum. Thus, improving these skills is a whole-school matter.

#### 3. Provision for developing numeracy skills through other subjects

There are opportunities for drawing mathematical experience out of a wide range of activities, in most if not all subject areas. Mathematics contributes to many subjects of the curriculum, both in practical and more theoretical ways. These examples are provided to help identify some of these mathematical experiences.

##### 3.1 English

English lessons can help to develop and support pupils' numeracy skills, for example, by use of mathematical vocabulary and technical terms, by asking children to read and interpret problems to identify the mathematical content, and by encouraging them to explain, argue and present their conclusions to others.

### 3.2 Science

Almost every scientific investigation or experiment is likely to require one or more of the mathematical skills of measuring, classifying, counting, calculating, estimating, and recording in tables and graphs. In science, pupils will, for example, order numbers, including decimals, calculate simple means and percentages, use negative numbers when taking temperatures, decide whether it is more appropriate to use a line graph or bar chart, and plot, interpret and predict from graphs.

### 3.3 Art & Design, Design & Technology

Measurements are often needed in art and technology. Many patterns and constructions are based on spatial ideas and properties of shapes, including symmetry. A lot of work is also undertaken using estimation of measurements and quantities. Designs may need enlarging or reducing, introducing ideas of multiplication and ratio. When dealing with recipes and cooking, pupils will carry out a great deal of measurement calculations, which include working out times and calculating cost.

### 3.4 ICT

Pupils will apply and use mathematics in a variety of ways when they solve problems using ICT. For example, they will collect and classify data, enter it into data handling software, produce graphs and tables, and interpret and explain their results. Their work in control includes the measurement of distance and angles, using uniform non-standard then standard measures. When they use computer models and simulations they will draw on their abilities to manipulate numbers and identify patterns and relationships.

### 3.5 History, Geography and Religious Education

In history and geography pupils will collect data by counting and measuring and make use of measurements of many kinds. The study of maps includes the use of co-ordinates and ideas of angle, direction, position, scale and ratio. The pattern of the days of the week, the calendar and recurring annual festivals all have a mathematical basis. For older pupils, historical ideas require understanding of the passage of time, which can be illustrated on a time line, similar to the number line that they already know.

### 3.6 Physical Education and Music

Athletic activities require measurement of height, distance and time, while ideas of counting, time, symmetry, movement, position and direction are used extensively in music, dance, gymnastics and ball games.

### 3.7 Careers and PSHE

In these two areas numeracy can be directly related to everyday life. Budgeting, paying bills, running a home and other money management issues can be undertaken.

### 3.8 Business Studies

Within this subject there is wide scope for numeracy in relation to real life situations. Also there is scope for handling data with meaningful figures. This can augment work carried out in other departments.

### 3.9 Modern Languages

Looking at a currency within a country. Calculations in a foreign language. A great deal of work that is already undertaken in the mathematics classes and careers can be applied here to learn about different countries.

The key to making the most of all these opportunities is to identify the mathematical possibilities across the curriculum at the planning stage. Teachers of all subjects should make the links between subjects and numeracy explicit by talking about links frequently in their classes, also drawing pupils' attention to the links between subjects by discussing both in mathematics and in other lessons.

## 4. Developing a consistent approach to numeracy

We aim to develop a consistent approach to the teaching of numeracy in order to establish continuity and progression throughout the school.

Teaching staff should ensure that:

- pupils always decide first whether a mental method is appropriate;
- before attempting any calculation, pupils estimate the approximate size of the answer;
- pupils always check their answers, preferably using a different method e.g. the inverse operation, check percentages add to 100%, cross-check totals in tables, etc;
- pupils check that their answers make sense in the context of the question e.g. you can't have 2.6 people in a car, but you could have a mean of 2.6 people per car;
- pupils are encouraged to show their working clearly when using written methods of calculation - as an example to pupils, teachers should ensure that all working done on board, worksheets, etc. is clearly set out and uses appropriate methods;
- pupils are encouraged to explain their methods;
- correct mathematical language is used where appropriate;
- pupils who make persistent mistakes return to the method that they can use accurately until ready to move on; and
- pupils are encouraged to learn number and multiplication facts by heart.

Teachers should discuss errors with pupils and diagnose problems before working through the problems with them, rather than simply re-teaching the method.

## 5. Roles and Responsibilities

### 5.1 Assistant Headteacher (Responsibility for KS3 Strategy)

- To oversee, in conjunction with the Numeracy Co-ordinator and the Head of Mathematics, the implementation of this policy by all departments and their staff.
- To support and monitor the Numeracy Co-ordinator in the delivery of training to staff, the provision of support material to supplement the policy, and the monitoring of the effectiveness of the policy in its aims.

### 5.2 Head of Mathematics

- To support the Numeracy Co-ordinator in the delivery of the provisions of the numeracy policy.
- To help monitor the effectiveness of other subject areas' contribution to developing the numeracy skills of our pupils.

### 5.3 Numeracy Co-ordinator

- To ensure all departments receive appropriate training concerning the mathematical background of our pupils, especially with regard to the effects of the National Numeracy Strategy at Key Stages 1 and 2.
- To develop resource material for use within departments.
- To work with all curriculum areas to ensure that the teaching of numeracy becomes consistent across all departments and key stages.
- To monitor the provision of the whole-school numeracy strategy, and work with the Head of Mathematics and Assistant Headteacher (Responsibility for Key Stage 3 Strategy) to evaluate the effectiveness of the strategy.

### 5.4 Teachers - Mathematics

- To ensure numeracy skills are promoted and developed in line with the National Curriculum, and the Framework For Teaching Mathematics: Years 7, 8 and 9.
- To take the lead role in developing the numeracy skills of pupils through the mathematics curriculum.
- To provide information to other subject teachers on appropriate expectations of students and difficulties likely to be experienced in various age and ability group.
- To be aware of the mathematical techniques used in other subjects and provide assistance and advice to other departments, so that a correct and consistent approach is use in all subjects.
- To seek opportunities to use topics and examination questions from other subjects in mathematics lessons.

### 5.5 Teachers - Other subjects

Teachers in other learning areas share many of these responsibilities. Each area has its own numeracy requirements, and pupils may not always have acquired from their study of mathematics the particular knowledge and skills needed to meet them. Teachers in other areas of study therefore have a responsibility to help pupils attain the level of numeracy their areas demand. In this way all teachers contribute to their pupils' developing numeracy.

#### 5.5.1 Subject Leaders

- To support members of their department in promoting cross-curricular numeracy skills.
- To ensure that new staff are made aware of the policy, and copies of training materials are made available to them.
- To develop schemes of work that highlight areas where numeracy skills can be promoted within their subject area.

- To ensure members of their department look to actively promote numeracy skills in their lessons.

#### 5.5.2 All subject teachers

- To promote a positive attitude towards both numeracy and mathematics in lessons, and recognise that numeracy is best promoted through purposeful teaching and enjoyable learning opportunities.
- To ensure that they are familiar with correct mathematical language, notation, conventions and techniques, relating to their own subject, and encourage students to use these correctly.
- To ensure a consistent approach to the teaching of numeracy skills, in line with the numeracy policy.
- To be alert to opportunities that they can use deliberately to reinforce and augment their pupils' numeracy and to consider any opportunities for cross-curricular involvement.
- To be aware of appropriate expectations of students and difficulties that might be experienced with numeracy skills.

#### 5.5.3 Teaching Assistants

Our teaching assistants play a vital role in supporting the teaching staff, and many of our pupils. It is essential, therefore, that the training and materials made available to teaching staff are also made available to the team of teaching assistants, as well as the opportunity to discuss specific difficulties experienced by pupils, with members of the mathematics department.

### 6 Monitoring and Evaluation

In monitoring and evaluating the effectiveness of this policy, it is worth noting the inspection criteria that OFSTED would use:

*When you report on standards in mathematics, give due attention to numeracy and pupils' competence in using their knowledge, skills and understanding of number, not only in mathematics, but also in other subjects. In relation to numeracy, establish:*

- *Whether there is clear understanding and consistent practice among teachers of mathematics in the development of pupils' mental skills, written methods of calculation and use of calculators;*
- *How well the mathematics department is building on the impact of the National Numeracy Strategy in Key Stage 2, and what impact this is having on its own numeracy strategy;*
- *If pupils can identify and use an efficient strategy for the calculations they need to do, and if they cope well with the mathematical demands made in different subjects or are held back through lack of mathematical knowledge or poor basic skills in numeracy; and*
- *How well numeracy and, where appropriate, other mathematical skills are taught, developed or practised in other subjects.*

*Gather evidence from other subjects of the extent to which pupils can:*

- *Recall number facts and manipulate whole numbers (positive and negative), fractions, decimals and percentages;*
- *Use the methods of calculation they have been taught in mathematics lessons in different curricular contexts;*
- *Use calculators and ICT efficiently, and recognise when these are inappropriate tools;*
- *Estimate and judge the reasonableness of their solutions, check their methods and answers and give results to a required degree of accuracy;*
- *Solve problems where they need to identify the calculations required, and interpret and check their results in the context of the original problem;*
- *Substitute numbers into formulae; and use and make sense of information presented in tables, charts and diagrams, and graphically;*
- *Collect both discrete and continuous data, represent data pictorially and graphically, analyse data and make predictions; and*
- *Explain their strategies and methods and use correct mathematical vocabulary.*

*These are the characteristics of a numerate pupil. They should help to inform inspectors of other subjects about the quality of numeracy. It would be unreasonable to expect evidence on each characteristic in every subject, but inspectors should report any examples they find to help build up a coherent picture of numeracy in the school.*

Inspecting mathematics 11-16 with guidance on self evaluation  
(Ofsted 2001, p25)

Provision of the policy should be monitored by subject leaders, with reference to these Ofsted criteria. In particular, subject leaders should ensure that:

- schemes of work are clearly annotated to highlight opportunities to support/develop numeracy skills
- lesson observation records make reference to used/missed opportunities within classroom teaching
- cross-curricular numeracy is a regular item for discussion at departmental meetings

The numeracy coordinator will provide cross-curricular numeracy audit documents for departments to discuss and complete annually.

## 7 Expectations

We recognise the importance of developing numeracy across the curriculum long term and therefore appendices will be added to this policy as they are developed and agreed:

- Standard approaches to calculation (including calculations involving fractions, percentages and ratio)
- School policy on calculator use
- Agreed mathematical vocabulary and notations
- Lists of units used for measurements
- Agreed methods for drawing and labelling graphs, charts and diagrams